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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/822,699	04/13/2004	Nam-su Kim	1572.1265	2919
21171 7590 07/11/2007 STAAS & HALSEY LLP SUITE 700 1201 NEW YORK AVENUE, N.W. WASHINGTON, DC 20005			EXAMINER DAVIDSON, DREW ALAN	
			ART UNIT 3709	PAPER NUMBER
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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

## Office Action Summary

Application No.

10/822,699

Applicant(s)

KIM, NAM-SU

Examiner

Drew Davidson

Art Unit

3709

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 01 February 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-24 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-24 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date 4/04 and 2/07.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

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## DETAILED ACTION

### *Priority*

Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

### ***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 14 and 15 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 14 recites the limitation "the sensor coil" in lines 2 and 3. There is insufficient antecedent basis for this limitation in the claim. Claim 15 recites the limitation "the sensor coil" in lines 2 and 3. There is insufficient antecedent basis for this limitation in the claim.

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-3 are rejected under 35 U.S.C. 102(b) as being anticipated by Shimizu et al. (U.S. Patent 4,804,913).

Regarding claims 1-3:

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Shimizu et al. '913 disclose a piston-cylinder device having a magnetic-ring/core (item 21b in Fig. 4) on one end of a piston (item 21e in Fig. 4), a detection-head/bobbin (item 20 in Fig. 4) housing a first and second coil (items A1 and C1 in Fig. 4), and the magnetic-ring/core shorter than half the length of the first and second coils arranged end-to-end, since Shimizu et al. '913 state the length of each coil is substantially equal to the length of the magnetic-ring/core (6:10-11), thus encompassing each coil slightly longer than the magnetic-ring/core. Shimizu et al. '913 disclose a controller (Fig. 5) capable of controlling piston position and top clearance.

Note that the term "linear compressor" is considered intended use, and therefore given little patentable weight.

Claims 16-21 are rejected under 35 U.S.C. 102(b) as being anticipated by Shimizu et al. (U.S. Patent 4,804,913).

Regarding claims 16-20:

Shimizu et al. '913 disclose a piston-cylinder device having a detection-head/bobbin (item 20 in Fig. 4) defining an aperture with first and second coils therein (items A1 and C1 in Fig. 4), a magnetic-ring/core (item 21b in Fig. 4) attached to a piston (item 21e in Fig. 4) and disposed coaxially in the aperture, and the magnetic-ring/core shorter than half the combined length of the first and second coils, since Shimizu et al. '913 state the length of each coil is substantially equal to the length of the magnetic-ring/core (6:10-11), thereby allowing each coil to be slightly longer than the

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magnetic-ring/core. Shimizu et al. '913 disclose a controller (Fig. 5) capable of controlling piston position and top clearance.

Note that the term "linear compressor piston control device" is considered intended use, and therefore given little patentable weight.

Regarding claim 21:

Shimizu et al. '379 teach the length of each coil to be substantially equal to the length of the magnetic-ring/core, and hence to each other (6:10-11). Shimizu et al. '379 teach by implication the coils to have equal inductances to enable the phase-shifting method. Shimizu et al. '379 teach the coils to have the same number of turns by implication since, as a practical matter, coils of equal length and inductance have the same number of turns.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 4-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shimizu et al. (U.S. Patent 4,804,913) in view of Mukai et al. (JP 2000111307).

Shimizu '913 teaches the basic claimed apparatus as set forth above.

Regarding claims 4-7:

Shimizu et al. '913 disclose a piston-cylinder device having a magnetic-ring/core (item 21b in Fig. 4) on one end of a piston (item 21e in Fig. 4), a detection-head/bobbin

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(item 20 in Fig. 4) housing a first and second coil (items A1 and C1 in Fig. 4), and the magnetic-ring/core shorter than half the length of the first and second coils arranged end-to-end, since Shimizu et al. '913 state the length of each coil is substantially equal to the length of the magnetic-ring/core (6:10-11), thus encompassing each coil slightly longer than the magnetic-ring/core. Shimizu et al. '913 disclose a controller (Fig. 5) capable of controlling piston position and top clearance.

Shimizu et al. '913 does not teach the coils in branches. Mukai et al. '307 teach first and second branches comprising first and second coils (L1 and L2 in Fig. 1(b)) in series with first and second resistors (R1 and R2 in Fig. 1(b)), a power source (item 5 in Fig. 1(b)) applied to the branches, and voltages applied from the resistors and coils (VD in Fig. 1(b), 2(a), and 2(b)) to a comparator (item 8 in Fig. 3) capable of zero output. Shimizu et al. '913 and Mukai et al. '307 are analogous art because they are concerned with the similar technical difficulty of detecting displacement. At the time applicants' invention was made, it would have been obvious to a person having ordinary skill in the art to have provided the branches and comparator taught by Mukai et al. '307 in the piston-cylinder device of Shimizu et al. '913. The motivation would have that Mukai et al. '307 suggest that the branches and comparator are an equivalent and alternative form for a position detecting circuit.

Claims 8-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schwarz et al. (WO 01/48379) in view of Shimizu et al. (U.S. Patent 4,804,913).

Regarding claims 8 and 9:

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Schwarz et al. '379 teach a compressor control method (4:5) comprising measuring a time  $t_0$  a reciprocating piston travels beyond a position R (5:29-33), and controlling a piston position based on  $t_0$  by setting voltage of the motor driving the piston (6:3-4).

Schwarz et al. '379 do not teach detecting piston position using a core and first and second coils in a bobbin. Shimizu et al. '913 teach detecting a position using a magnetic-ring/core (item 21b in Fig. 4) combined to one end of a piston (item 21e in Fig. 4), a detection-head/bobbin (item 20 in Fig. 4) having first and second coils (items A1 and C1 in Fig. 4), and the magnetic-ring/core shorter than half the length of the first and second coils combined, since Shimizu et al. '913 state the length of each coil is substantially equal to the length of the magnetic-ring/core (6:10-11), thereby allowing each coil to be slightly longer than the magnetic-ring/core. Schwarz et al. '379 and Shimizu et al. '913 are analogous art because they are concerned with the similar technical difficulty of position detection. At the time applicants' invention was made, it would have been obvious to a person having ordinary skill in the art to have used the core, coil, and bobbin construction taught by Shimizu et al. '913 in the method of Schwarz et al. '379. The motivation would have been that Shimizu suggests that a core, coil, bobbin arrangement is an equivalent and alternative method of detecting position.

Regarding claim 10:

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Schwarz et al. '379 teach decreasing-piston-stroke/increasing-top-clearance if time  $t_0$  is longer than desired (i.e. as required by the cooling load or as required to avoid piston collision, 8:2-5).

Claims 11-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schwarz et al. (WO 01/48379) in view of Shimizu et al. (U.S. Patent 4,804,913).

Regarding claim 11, 14, and 15:

Schwarz et al. '379 teach a compressor control method (4:5) comprising measuring a time  $t_0$  a reciprocating piston travels beyond a position R (5:29-33), and controlling a piston stroke based on the time by setting voltage of the driving motor (6:3-4).

Schwarz et al. '379 do not teach a core. Shimizu et al. '913 teach detecting a position using a magnetic-ring/core (item 21b in Fig. 4) combined to one end of a piston (item 21e in Fig. 4) and a coil (item A1 in Fig. 4). Schwarz et al. (WO 0148379) and Shimizu et al. (U.S. Patent 4,804,913) are analogous art because they are concerned with the similar technical difficulty of position detection. At the time applicants' invention was made, it would have been obvious to a person having ordinary skill in the art to have combined the core to the piston and provided the coil as taught by Shimizu et al. '913 to detect a position in the method of Schwarz et al. '379. The motivation would have been that Shimizu et al. '913 suggest that providing a core and coil arrangement is an equivalent and alternative method of detecting position.

Regarding claim 12:



Schwarz et al. '379 teach increasing/decreasing piston stroke with increasing/decreasing cooling/load (6:10-11).

Regarding claim 13:

Schwarz et al. '379 teach decreasing-piston-stroke/increasing-top-clearance if time  $t_0$  is longer than desired (i.e. as required by the cooling load or as required to avoid piston collision, 8:2-5).

Claims 22-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shimizu et al. (U.S. Patent 4,804,913) in view of Mukai et al. (JP 2000111307).

Shimizu et al. '913 teach the basic claimed apparatus as set forth above.

Regarding claims 22-24:

Shimizu et al. '913 disclose a piston-cylinder device having a detection-head/bobbin (item 20 in Fig. 4) defining an aperture with first and second coils therein (items A1 and C1 in Fig. 4), a magnetic-ring/core (item 21b in Fig. 4) attached to a piston (item 21e in Fig. 4) and disposed coaxially in the aperture, and the magnetic-ring/core shorter than half the combined length of the first and second coils, since Shimizu et al. '913 state the length of each coil is substantially equal to the length of the magnetic-ring/core (6:10-11), thereby allowing each coil to be slightly longer than the magnetic-ring/core. Shimizu et al. '913 disclose a controller (Fig. 5) capable of controlling piston position. Schwarz et al. '379 teach the length of each coil to be substantially equal to the length of the magnetic-ring/core, and hence to each other (6:10-11). Schwarz et al. '379 teach by implication the coils to have equal inductances

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to enable the phase-shifting method. Shimizu et al. '379 teach the coils to have the same number of turns by implication since, as a practical matter, coils of equal length and inductance have the same number of turns.

Note that the term "linear compressor piston control device" is considered intended use, and therefore given little patentable weight.

Shimizu et al. '913 do not teach the coils in branches, comparator, or DSP. Mukai et al. '307 teach first and second branches comprising first and second coils (L1 and L2 in Fig. 1(b)) in series with first and second resistors (R1 and R2 in Fig. 1(b)). Mukai et al. '307 teach a comparator and DSP (item 8 in Fig. 3) receiving voltages (VS1 and VS2 in Fig. 1(b)) from each branch and outputting a voltage (VD in Fig. 1(b), 2(a), and 2(b)) capable of being zero. Shimizu et al. '913 and Mukai et al. '307 are analogous art because they are concerned with the similar technical difficulty of detecting displacement. At the time applicants' invention was made, it would have been obvious to a person having ordinary skill in the art to have provided the branches, comparator, and DSP as taught by Mukai et al. '307 in the piston-cylinder device of Shimizu et al. '913. The motivation would have been to sense piston position.

### ***Double Patenting***

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140

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F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claims 1 and 2 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claim 1 of copending Application No. 10/822,686 (referred to hereafter as Kim '686) in view of Schwarz et al. (WO 01/48379).

Regarding claims 1 and 2:

Kim '686 claims in 1 a linear compressor having a core on a piston end, first and second coils, the core comprising an upper core half the length of the first and second coils.

Kim '686 does not claim a controller in 1. Schwarz et al. '379 teach a microcontroller/controller (item 41 in Fig. 6, 5:24). Kim '686 and Schwarz et al. '379 are analogous art because they are concerned with the similar technical difficulty of position control. At the time applicants' invention was made, it would have been obvious to a person having ordinary skill in the art to have added a microcontroller/controller (Schwarz et al. '379) to a compressor (Kim '686). The motivation would have been to control the compressor.

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This is a provisional obviousness-type double patenting rejection.

Claim 4 is provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claim 4 of copending Application No. 10/822,686 (referred to hereafter as Kim '686) in view of Schwarz et al. (WO 01/48379).

Regarding claim 4:

Kim '686 claims in 1 a linear compressor having a core on a piston end, first and second coils, the core comprising an upper core half the length of the first and second coils. Kim '686 claims in 4 the compressor according to claim 1 (of Kim '686), comprising first and second branches, each comprising a resistor and one of the coils, power applied to the branches, and a comparator receiving voltages from the resistors.

Kim '686 does not claim a controller in 1. Schwarz et al. '379 teach a microcontroller/controller (item 41 in Fig. 6, 5:24). Kim '686 and Schwarz et al. '379 are analogous art because they are concerned with the similar technical difficulty of position control. At the time applicants' invention was made, it would have been obvious to a person having ordinary skill in the art to have added a microcontroller/controller (Schwarz et al. '379) to a compressor (Kim '686). The motivation would have been to control the compressor.

This is a provisional obviousness-type double patenting rejection.

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Claim 5 is provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claim 5 of copending Application No. 10/822,686 (referred to hereafter as Kim '686) in view of Schwarz et al. (WO 01/48379).

Regarding claim 5:

Kim '686 claims in 1 a linear compressor having a core on a piston end, first and second coils, the core comprising an upper core half the length of the first and second coils. Kim '686 claims in 4 the compressor according to claim 1 (of Kim '686), comprising first and second branches, each comprising a resistor and one of the coils, power applied to the branches, and a comparator receiving voltages from the resistors. Kim '686 claims in 5 the compressor according to claim 4 (of Kim '686), with the comparator inputs taken from the opposite terminals of each coil.

Kim '686 does not claim a controller in 1. Schwarz et al. '379 teach a microcontroller/controller (item 41 in Fig. 6, 5:24). Kim '686 and Schwarz et al. '379 are analogous art because they are concerned with the similar technical difficulty of position control. At the time applicants' invention was made, it would have been obvious to a person having ordinary skill in the art to have added a microcontroller/controller (Schwarz et al. '379) to a compressor (Kim '686). The motivation would have been to control the compressor.

This is a provisional obviousness-type double patenting rejection.

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Claim 11 is provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claim 12 of copending Application No. 10/822,686 (referred to hereafter as Kim '686).

Regarding claim 11:

Kim '686 claims in 12 a method comprising timing a core driven by a piston and controlling piston stroke by varying compressor input power.

This is a provisional obviousness-type double patenting rejection.

Claims 16-20 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claim 6 of copending Application No. 10/822,686 (referred to hereafter as Kim '686) in view of Shimizu et al. (U.S. Patent 4,804,913).

Regarding claims 16-20:

Kim '686 claims in 6 a linear compressor according to claim 1 (of Kim '686) having a core on a piston end, first and second coils, the core being half the length of the first and second coils. Kim '686 claims a controller in 6.

Kim '686 does not claim a bobbin. Shimizu et al. '913 disclose a magnetic-ring/core (item 21b in Fig. 4) disposed coaxially in the aperture of a detection-head/bobbin (item 20 in Fig. 4) containing coils (items A1 and C1 in Fig. 4). Kim '686 and Shimizu et al. '913 are analogous art because they are both concerned with the similar technical difficulty of piston position sensing. At the time applicants' invention was made, it would have been obvious to a person having ordinary skill in the art to

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have disposed the coils (Kim '686) in a bobbin (Shimizu et al. '913), and to have disposed the core (Kim '686) coaxially in the bobbin aperture (Shimizu et al. '913). The motivation would have been to support the coils and align the core motion relative to the coils.

This is a provisional obviousness-type double patenting rejection.

Claims 1 and 4 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 4 and 8, respectively, of copending Application No. 11/030,434 (referred to hereafter as Kim '434) in view of Shimizu et al. (U.S. Patent 4,804,913).

Regarding claim 1:

Kim '434 claims in 4 a compressor control apparatus according to claim 3 (of Kim '434) having a core associated with a piston. Kim '434 claims in 4 first and second coils. Kim '434 claims in 4 a compressor control apparatus according to claim 1 (of Kim '434) having a controller.

Kim '434 does not claim a bobbin. Shimizu et al. '913 disclose a detection-head/bobbin (item 20 in Fig. 4) containing coils (items A1 and C1 in Fig. 4). Kim '434 and Shimizu et al. '913 are analogous art because they are both concerned with the similar technical difficulty of piston position sensing. At the time applicants' invention was made, it would have been obvious to a person having ordinary skill in the art to have disposed the coils (Kim '434) in a bobbin (Shimizu et al. '913). The motivation would have been to support the coils.

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Regarding claim 4:

Kim '434 claims in 8 the apparatus of claim 4 (of Kim '434) having a core associated with a piston, first and second coils, a resistor connected to each coil forming first and second branches, a power source applied to the branches in parallel, and a comparator with inputs from the resistors.

Kim '434 does not claim a bobbin. Shimizu et al. '913 disclose a detection-head/bobbin (item 20 in Fig. 4) containing coils (items A1 and C1 in Fig. 4). Kim '434 and Shimizu et al. '913 are analogous art because they are both concerned with the similar technical difficulty of piston position sensing. At the time applicants' invention was made, it would have been obvious to a person having ordinary skill in the art to have disposed the coils (Kim '434) in a bobbin (Shimizu et al. '913). The motivation would have been to support the coils.

This is a provisional obviousness-type double patenting rejection.

***Contact Information***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Drew Davidson whose telephone number is (571)270-3290. The examiner can normally be reached on Monday through Friday 8:30 AM through 5:00 PM EST.


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Eashoo can be reached on (571)272-1197. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.



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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

D.D.  
6/27/07

  
MARK EASHOO, PH.D.  
SUPERVISORY PATENT EXAMINER

09/Jul/07